



Demand Response Research and Development Program

Ron Hofmann
Program Advisor

Energy Systems Integration
Public Interest Energy Research Program
California Energy Commission



Program Context

- ★ **The electricity crisis of 2000/2001 had many contributing factors**
 - ◆ Market power (Enron, et al)
 - ◆ Aging fossil fuel plants
 - ◆ Flaws in deregulation (AB 1890)
 - ◆ Disconnect between wholesale and retail prices
- ★ **However, most agree that one mitigating factor was missing**

DEMAND RESPONSE



Core Program

DEMAND RESPONSE (DR)

- ★ **DR is the action required to reduce load**
 - ◆ When contingencies threaten supply-demand balance, and/or
 - ◆ When market conditions raise supply costs
- ★ **DR involves transient-load reductions**
 - ◆ DR vs. energy efficiency “strategies”, i.e., transient vs. permanent



OPERATIONAL DEFINITION

- ★ **DR for this R&D program** is the ability of electricity users to **respond automatically to** time- and location-dependent price and contingency **signals** (that have varying amplitude and duration) to reduce/shift loads



HISTORY

★ **PIER commissioned 3 scoping studies**

- ◆ “Real Time Pricing in California, R&D Issues and Needs”, by Ahmad Faruqui, Joe Hughes, and Melanie Mauldin;
- ◆ “Load As a Reliability Resource in Restructured Electricity Markets”, J. D. Kueck, B. J. Kirby, J. Eto, R. H. Staunton, C. Marnay, C. A. Martinez, C. Goldman; and
- ◆ “Advanced Meter Scoping Study”, Levy Associates.



HISTORY (continued)

- ★ **These scoping studies led to a November 16, 2001 roundtable discussion**
- ★ **The primary conclusions from the roundtable were**
 - ◆ Real-time signaling (e.g., pricing) should be a building block for a long-term/permanent DR capability in California



HISTORY (continued)

- ◆ Real-time metering technology is cost-effective for large commercial and industrial (LC&I) customers
- ◆ Real-time technology was in 2000-2001 too expensive for implementing a statewide real-time signaling infrastructure that includes residential customers



HISTORY (continued)

- ◆ The CPUC could use market information from programs in other states in order to assess the implementation of real-time pricing tariffs
- ◆ The California ISO needs help to establish a DR R&D agenda for making loads responsive to their needs



PROGRAM

- ★ **Five DR project areas were created**
 - ◆ Demonstrations and Case Studies
 - ◆ Enabling Technologies Development
 - ◆ Market Information Development
 - ◆ Test Bed and Tariff Development
 - ◆ CAISO-oriented DR for Reliability
- ★ **Four project areas are underway**



TODAY'S SPEAKERS

- ★ **DR Research Center at LBNL**
 - ◆ Understanding Customer Response
 - ◆ Automatic DR in Large Facilities
- ★ **Load as a Resource through CERTS**
- ★ **Disruptive Technology through DR ETD**
 - ◆ 10x10
 - ◆ Collaborative and multi-disciplinary
- ★ **Center for Study of Energy Markets**